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A COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM FOR THE MERAMEC RIVER BASIN DEVELOPED BY STATE OF MISSOURI DIVISION OF HEALTH AND U.S. PUBLIC HEALTH SERVICE

Public Health Service
Cincinnati, Ohio

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

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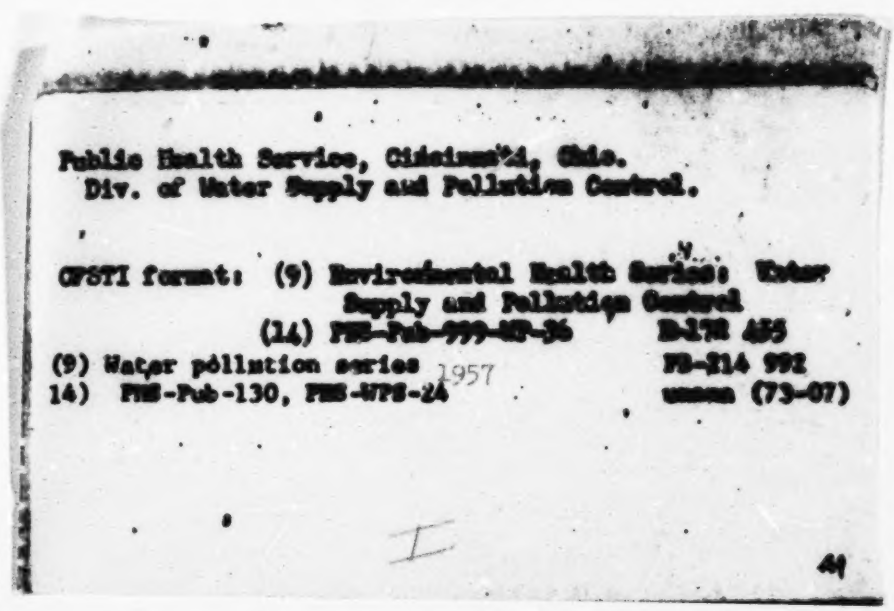

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FOREWORD

Our country's development over the past 50 years has been marked by tremendous progress in many fields. It has made possible great gains in the health, comfort, and well-being of the people. But it has not been without cost. Part of the cost has been the damage to the Nation's water resources that has resulted from wastes discharged to the streams by our growing cities and industries. All water uses have been affected -- public water supplies, recreation, agriculture, industry, fish and other aquatic life.

The Public Health Service, as part of its responsibilities under the Federal Water Pollution Control Act, Public Law 660, 84th Congress, is required to prepare or develop comprehensive programs for the abatement of pollution in cooperation with other Federal agencies, State and interstate water pollution control agencies, municipalities and industries.

This publication summarizes the "Comprehensive Water Pollution Control Program for the Meramec River Drainage Basin" as developed by the Missouri Division of Health and the Public Health Service of the U. S. Department of Health, Education, and Welfare. The program gives full consideration to the several present uses and to the reasonably anticipated future uses of the waters of the basin. It provides an equitable balance in the pollution control requirements for various private and public groups concerned.

This program is based on beneficial water uses and related conditions that prevailed on July 1, 1956. Comprehensive programs for pollution control must necessarily be flexible. They must allow for growth, development, and changing conditions. Any significant changes affecting water quality, such as stream flow, water use, industrial development, population, etc., may require changes in the pollution control program.

Obviously the mere adoption of this program will not, in itself, reduce pollution or improve the usefulness of the waters of the basin. It does provide to the citizens of the area and to the city officials and industrial leaders, farmers, fishermen, conservationists, and others an objective plan based on good engineering practice and reflecting sound economics. It is a plan which requires public support if progress is to be made in the abatement of pollution.

Certain additional considerations beyond the mere acceptance of a plan are essential to its successful execution. The citizens of the area affected must see that sufficient resources are provided to the State water pollution control agencies concerned to enable them to make the technical investigations necessary to aid those responsible for constructing pollution abatement works.

We should recognize too, that in order to be fully effective the plans and programs of one State must be geared closely to those of adjoining States, since State boundaries are no barrier to pollution traveling in interstate streams. Above all, no program of this nature

can progress beyond the report stage if its meaning and purpose are not made clear and understandable to the citizens of the area. In the final analysis they are the ones who will pay, directly or indirectly, for the pollution abatement works needed.

It is my hope that this program for the Meramec River Drainage Basin will be carried through to completion as soon as possible so that the area may enjoy all the benefits that clean water can provide in health and recreational opportunities for the people and in sound growth of industry and agriculture.

L. E. Burney
Surgeon General

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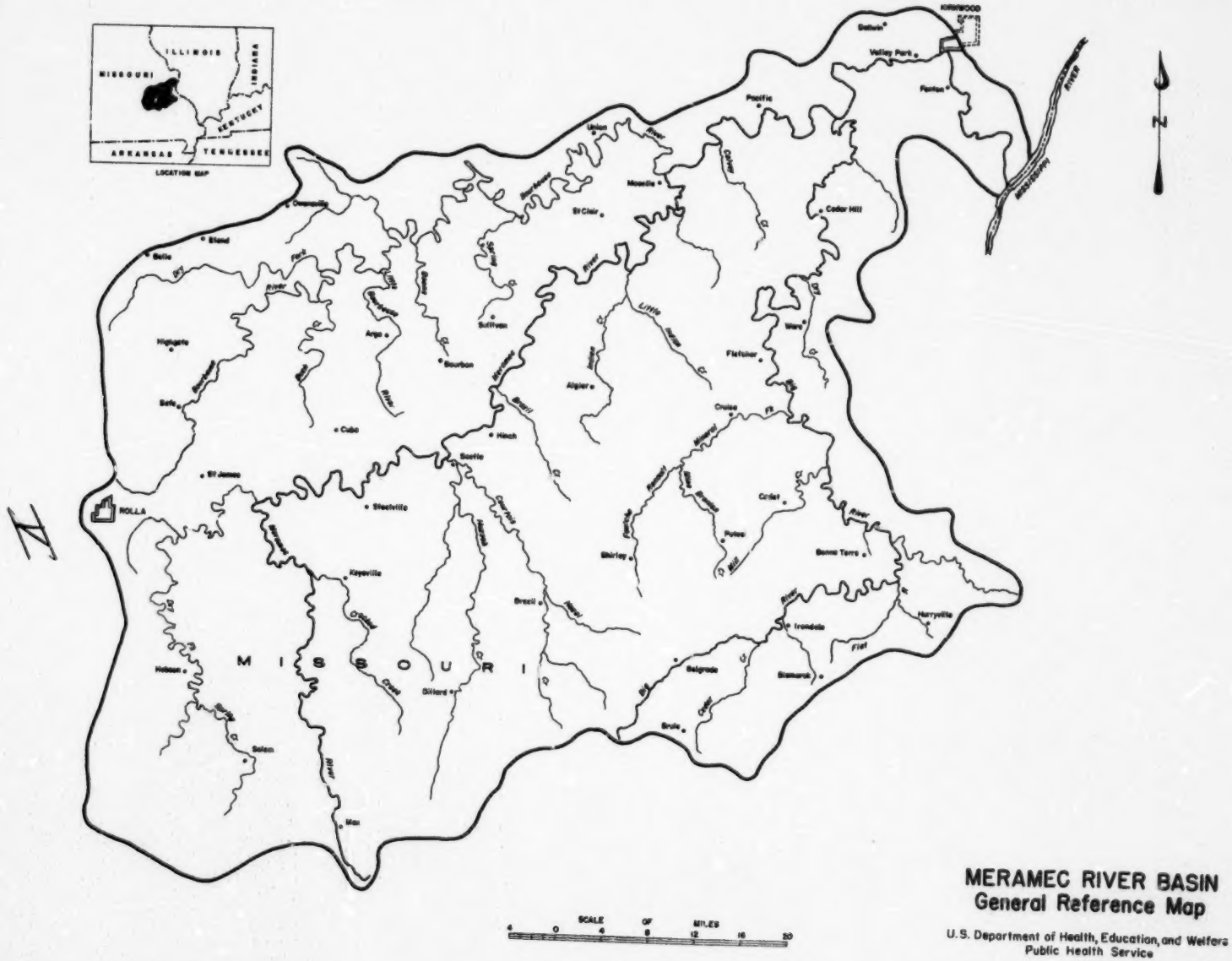

MERAMEC RIVER BASIN
General Reference Map

U.S. Department of Health, Education, and Welfare
Public Health Service

INTRODUCTION

The comprehensive program for the Meramec River Basin is based on the water pollution control program of the Missouri Division of Health. Reports of State or State and Federal cooperative investigations of this stream have been published and have considered present and anticipated future water uses, the quality of water necessary to permit these uses, sources of pollution and their effects on receiving waters and water uses, benefits derived from abatement of pollution, the added detrimental effects of critical low flows in the streams, and needed abatement facilities. The reports upon which this program is based are as follows:

(1) Meramec River Pollution Study (1943) - Report of a joint study by Missouri State Board of Health, Division of Public Health Engineering and Industrial Hygiene, in cooperation with Missouri State Planning Board, State Conservation Commission, and the Federal Works Progress Administration.

(2) A Program for the Meramec River Basin (1949) - A Summary Report of the Meramec Cooperative Investigation Field Committee jointly prepared by agencies of the State of Missouri and agencies of the United States Government. The report has eight separately published appendices which are also used as a basis for this program; these are:

Appendix I - Three Reservoirs for Flood Control and other purposes

Appendix II - An Agricultural Program for the Meramec Basin

Appendix III - Recreational Development of the Meramec River Basin

Appendix IV - Meramec Watershed Wildlife Survey and Management Plan

Appendix IV - A - Evaluation Report on Fish and Wildlife Resources in Relation to the Water Development Plan for the Meramec Basin

Appendix V - A Public Health Program for the Meramec River Basin

Appendix VI - A - The Mineral Deposits of the Meramec Drainage Basin

Appendix VI - B - Ground Water Supplies of the Meramec Basin, Missouri

Appendix VII - Hydroelectric Power Possibilities in the Meramec River Basin

Appendix VIII - A study of Small Upland Reservoirs

GENERAL DESCRIPTION

The Meramec River drains an area of 3,955 square miles lying west and south of St. Louis. Its headwaters rise in the Ozark Plateau. This rough, heavily wooded, and sparsely populated region occupies the south-central portion of the basin and is its most striking physiographic feature. The extreme southwestern portion of the basin is occupied by the more rolling Salem Plateau. To the east of the Ozark hill area lies an agricultural and mining area of hilly to rolling terrain drained by the Big River, one of the two principal tributaries of the Meramec. To the north, and extending along the entire northern border of the basin, is a long, narrow strip of rolling agricultural land drained by the Bourbeuse River, the other main tributary. The elevation of the basin varies from 1,500 feet above sea level in the Ozark hills to 450 feet where the Meramec enters the Mississippi River about 20 miles below St. Louis.

Farming and timber production are the basic and major industries of the area. However, large lead mines are located in the southeastern part of the basin and small scale strip mining operations for barium sulphate are found along the eastern border of the Ozark Plateau. Recreation is important, and becoming increasingly more so, in the economy of the basin as a result of the attractive nature of its woods and waters and of its proximity to St. Louis.

About 65 percent of the rural land is in farms, 27 percent in non-farm private holdings, and 8 percent in public ownership, the latter mainly in the Clark National Forest and various State Parks. About 60 percent of the entire area of the basin is still wooded and produces sufficient raw material to keep more than one hundred small wood-using industries in operation. The principal known mineral deposits in the basin are lead, barite, iron, silver, stone, and clays of commercial value. The most productive part of the world's largest lead-mining district is located in the Meramec Basin near Bonne Terre, Missouri. Lead ores valued at almost 800 million dollars have been taken from this district. The 1954 mineral production was valued at over 50 million dollars.

Groundwater is a valuable resource of the Meramec Basin. Thirty of the 34 public water supplies and most of the farm water supplies are derived from this source. Surface water is utilized as the source of raw water by four public water supplies in the basin. There are a large number of springs in the basin which contribute to the recreational assets by virtue of their utilization as water supply for campers. The springs also furnish water for farmsteads and livestock.

It appears certain that within a comparatively few years recreation will dominate the economy of the area. Some 8,000 summer cottages have already been built in the basin, most of them along the lower reaches of the main stream where swimming and boating are popular sports. Yet the present development is but a beginning in the utilization of the basin's recreational potentialities.

Fish and wildlife are valuable resources of the basin. They not only enhance the recreation industry but supplement the subsistence and income of the permanent residents. These resources can, moreover, be greatly expanded.

There are 16 severed communities with a total connected population of about 32,000 in the basin. Thirteen of these communities serving 26,400 have sewage treatment facilities although nine of these need additions or enlargement to adequately handle the present pollution load. Three communities, with a combined connected population of 5,700, discharge sewage directly to the streams without treatment. However, one of these now has treatment facilities under construction.

The condition of the streams as indicated by bacteriological determinations appears to be reasonably satisfactory except for the Big River below the City of Flat River, and in the lower reaches of the Big, Bourbeuse, and Meramec Rivers. There, the bacterial content is excessive in view of the recreational use made of the streams.

Increased time for recreation and increased population concentrations in rural areas and urban centers of the Basin will present problems in satisfactory sewage disposal which must be effectively solved in order to protect the water assets of the Basin. The existing degree of stream cleanliness must not only be maintained, but certain limited reaches must be improved in the interest of public health protection.

While the streams are not now grossly polluted, it is a foregone conclusion that, as recreational use increases, measures for control of stream pollution will have to be considerably broadened and intensified. The protection and enhancement of the water resources of the basin are important to its recreational development. The protection of the groundwater, which is the chief source of domestic water supply, is especially important.

WATER QUALITY OBJECTIVES

Present water uses, increased usability due to improved water quality, and protection of water rights and property values largely determine pollution control measures needed. The goal of water pollution control programs is to preserve water quality to best serve these interests.

The Engineering Section of the Missouri Basin Health Council, consisting of the chief sanitary engineers of the 10 Missouri Basin States, on January 7, 1954, adopted objectives as a guide for water pollution control programs in that Basin. The guide has been employed by the State of Missouri in the development of its comprehensive pollution control programs, and is used as the basis of the program presented in this report. It is recognized that changes in conditions, particularly as they may affect water uses, and alterations in types of water uses, may require future modifications in any established standards. The objectives adopted by the States of the Missouri Basin and used as a basis of this program are quoted as follows:

"Subject to (a) such higher objectives as may be desired by any State and (b) such other modification as may be deemed necessary, after appropriate investigation, by the State Water Pollution Control Agency concerned, the Engineering Section, Missouri Basin Health Council, recommends the following for consideration by the member States as a guide for water pollution control activities in the Missouri Drainage Basin.

"1. Toxic substances including metallic ions, phenolic compounds, oils, alkalies, and acids should be virtually eliminated from sewage effluents.

"2. Removal of settleable and floating solids to prevent sludge banks, floating materials, and nuisance conditions should be required as the minimum acceptable treatment.

"3. For industrial wastes similar in nature to municipal wastes, treatment should be based on the same premise as recommended for municipalities. For industrial wastes not comparable to municipal wastes, treatment should be provided as necessary to prevent deterioration of water quality for beneficial uses in the receiving stream.

"4. Additional treatment over that specified in item 2 above should be provided as necessary to protect downstream water uses. Quality objectives for certain water uses are:

"(a) For water serving as a source of domestic supply, raw water bacteriological quality should conform to that recommended in 'Manual of Recommended Water Sanitation Practices, 1946, Public Health Bulletin #296,' pages 11-13.

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"(b) For bathing or swimming waters, monthly arithmetical average 'most probable number' of coliform organisms should not exceed 1,000 per 100 ml. during any month of the recreational season; nor exceed this number in more than 20 percent of the samples examined during any month; nor exceed 2,400 per 100 ml. on any day. For nonbathing or nonswimming waters, the monthly arithmetical average 'most probable number' of coliform organisms should not exceed 5,000 per 100 ml. in any month of the recreational season, nor should exceed this number in more than 20 percent of the samples examined during any such month.

"(c) For fish and aquatic life a minimum oxygen concentration of 5.0 ppm is desirable in waters otherwise offering suitable fishery habitat, with 6.0 ppm for trout streams.

"(d) For bacteriological quality of irrigation water:

"(1) Sewage used for irrigation of forage crops should be given treatment insuring a consistent reduction in coliform bacteria of not less than 90 percent.

"(2) Sewage used for irrigation of human food crops should be given treatment insuring a consistent reduction (a) in suspended solids of not less than 75 percent, (b) in 5 day 20°B.O.D. of not less than 75 percent and (c) in coliform bacteria of not less than 98 percent, unless discharged into a stream where the volume of dilution water, available during the low flow periods during which irrigation diversions may occur, is at least 10 times greater than anticipated maximum daily volume of sewage, in which case a bacterial reduction of 90 percent may be acceptable.

"Provided, however, that where the time of passage from plant discharge to irrigation diversion is such as to permit the normal death rate of bacteria as evidenced by the die-away curve to provide equivalent bacterial reduction, the requirements of (1) and (2) above may be appropriately modified."

WATER POLLUTION CONTROL PROGRAM

The Missouri Division of Health has been aware of the pollution problems in the Meramec River watershed, as is indicated by the reports on the subject. It has cooperated in establishing a comprehensive program designed to correct undesirable conditions. Much has already been accomplished toward completion of this program as evidenced by the fact that 13 of the 16 sewered communities provide treatment for their wastes and a majority of the public resorts and tourist camps are licensed and meet minimum sanitation standards. However, the construction of three new municipal sewage treatment works and enlargement and additions to some of the existing treatment plants are required to complete the program. The need for improved sanitation practices at private and public camps and recreation centers is also recognized as a part of the program.

The water pollution control program for the Meramec River Basin is firmly based upon the findings of stream studies, surveys, and investigations. The corrective measures were determined only after a thorough consideration of all existing beneficial water uses in the basin as well as those that might materialize in the immediate foreseeable future. They are intended to restore, preserve, and protect water quality for those uses.

The program is flexible, not static, and is intended to reflect the needs for the present situation, as currently determined, but changes in stream characteristics, pollutional load, or water uses may require revision from time to time.

The essential elements of the program developed consist of the following:

1. Provide the following improvements at the earliest possible date:

Name and Location	Population Equivalent Discharged	Degree of Existing Treatment	Needed Pollution Control Measures
Belle	300	Secondary	Replacement or Enlargement
Bismarck	200	Secondary	Addition of Final Settling
Bland	150	Secondary	Addition of Final Tank
Bonne Terre	200	None	New Plant (Secondary)
Cuba	240	Secondary	Enlargement or Replacement
Flat River	3,000	Primary	Addition of Secondary Facilities

Name and Location	Population Equivalent Discharged	Degree Of Existing Treatment	Needed Pollution Control Measures
Pacific	320	Secondary	Enlargement or Replacement
Potosi	400	Secondary	Addition of Final Settling
Salem	800	Secondary	Enlargement or Replacement
Sullivan	300	Secondary	Enlargement or Replacement
Union	2,500	None	New Plant (now under construction)
Valley Park	3,000	None	New Plant

2. Operate all existing municipal and industrial waste treatment works at a uniformly high level of efficiency in order to obtain the maximum benefits from these facilities and permit their most effective utilization.

3. Provide adequate sanitary facilities and practices at camps and recreation centers to prevent pollution of surface and ground waters.

4. Control new or increased sources of pollution by providing adequate treatment or disposal.

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